Quality Management Plan

Agency Plan to Implement, Document, and Assess the Effectiveness of the Quality System Supporting Environmental Data Operations

June 2000

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Agency Plan to Implement, Document, and Assess the Effectiveness of the Quality System Supporting Environmental Data Operations

Washington State Department of Ecology
Environmental Assessment Program
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Table of Contents

Abstract

This *Quality Management Plan* is the Washington State Department of Ecology "blueprint" for applying quality assurance and quality control to environmental programs. It defines the quality system for planning, implementing, and assessing the effectiveness of activities supporting environmental data operations.

Introduction

The goals of the Washington State Department of Ecology (Ecology) are to prevent pollution, clean up pollution, and support sustainable communities and natural resources. Ecology managers and staff depend upon environmental data to make informed decisions related to these goals. Environmental data include results of chemical, physical, or biological measurements relating to the environment. Implementation of a comprehensive quality management plan is necessary to ensure that accurate environmental data are available to support those decisions. If inaccurate data are collected, faulty decisions may be made. Other problems that may arise from inaccurate data include wasted resources, legal liability, increased risks to health and the environment, inadequate understanding of the state of the environment, and loss of credibility.

Ecology is committed to developing sound quality assurance (QA) and quality control (QC) practices, and incorporating them into environmental studies and activities. These practices enable the staff to generate accurate data in a cost-effective manner.

The U.S. Environmental Protection Agency (EPA) requires Ecology to document its quality system in an approved *Quality Management Plan*. This requirement is communicated through several mechanisms including:

- 48 CFR Part 46, Federal Acquisition Regulations, for contractors
- 40 CFR Parts 30, 31, and 35 for assistance agreement recipients
- EPA Order 5360.1 CHG 1, which establishes a mandatory agency-wide quality system that applies to EPA, as well as all organizations performing work for EPA
- Other mechanisms, such as consent agreements in enforcement actions

Additionally, the *1994 Puget Sound Water Quality Management Plan* (amended May 1996) has been adopted as the *Puget Sound Estuary Program Comprehensive Conservation and Management Plan* under the federal Clean Water Act. Element L-4 of the plan requires Ecology to prepare a *Quality Management Plan* which should include requirements for QA project plans, training, and audits.

This *Quality Management Plan* has been prepared to meet EPA requirements, described in document QA/R-2, *EPA Requirements for Quality Management Plans*, November 1999. EPA requirements are based on the national consensus standard, ANSI/ASQC E4-1994, *Specifications and Guidelines for Environmental Data Collection and Environmental Technology Programs.*

This *Quality Management Plan* outlines the principles and practices that lead to effective planning and execution of environmental studies, and describes procedures for reporting QA/QC activities. It applies to all work performed by Ecology that involves the acquisition of environmental data generated from direct measurement activities, collected from other sources, or compiled from computerized databases and information systems.

This document replaces Ecology's 1993 *Quality Assurance Management Plan.*

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Quality System Components

The quality system is a structured and documented management system that provides the framework for planning, implementing, documenting, and assessing environmental data operations, as well as for carrying out required QA and QC activities.

The quality system encompasses both management and technical activities, and it requires the active participation of all employees.

The principal components of Ecology's quality system and the corresponding tools for implementing them include:

- Quality assurance policy (Ecology Executive Policy 1-21)
- Quality system documentation (*Quality Management Plan)*
- Annual reviews and planning (QA Report to Management and Performance Plans)
- Training in QA and QC (Training Plans)
- Systematic planning of projects (Data Quality Objectives Process)
- Project-specific quality documentation (QA Project Plans)
- Project and data assessments (Data Verification/Validation and Data Quality Assessment)
- Management assessments (Quality Systems Audits)

Other tools for implementing Ecology's quality system are the

- *Air Monitoring Quality Assurance Plan*
- *Lab Quality Assurance Manual*
- *Lab Users Manual*
- Field and laboratory Standard Operating Procedures (SOPs)
- *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*
- *Procedural Manual for the Environmental Laboratory Accreditation Program.*

Quality assurance is primarily a managerial activity while quality control is primarily a technical activity, but there is no sharp division between these two functions.

1. Quality assurance is a system for assuring the reliability of measurement data and, as such, is sometimes considered to encompass quality control.

2. Quality control involves the application of statistical procedures to evaluate and control the accuracy of measurement data.

Analytical quality control focuses on the control of analytical errors and uses charts for controlling the precision of analyses. Analytical quality assurance focuses on other aspects of the efficiency of analysis (e.g., control of sample handling and reports).

EPA's Quality Assurance staff has prepared a series of requirements and guidance documents that should be referenced for details on the implementation of a quality system. Appendix A includes EPA's Internet addresses for these documents and other sources of QA information.

Management and Organization

The mission of Ecology is to protect, preserve and enhance Washington's environment, and promote the wise management of our air, land and water for the benefit of current and future generations.

Ecology's Executive Policy 1-21, *Establishing Quality Assurance,* was adopted on August 25, 1993 and revised on October 6, 1999. The policy applies to environmental data collection studies conducted or funded by Ecology. It is the responsibility of agency management to promote the consistent application of quality assurance and quality control principles to the planning and execution of these studies and activities. A copy of the policy is included as Appendix B.

It is the intent of the policy that all environmental data be of documented quality, satisfy the requirements for their intended use, and be legally defensible. The policy is implemented by Ecology managers and staff. Appropriate QA and QC practices are used in all phases of environmental studies and activities, from development of the initial plan through sampling, measurement, assessment, and use of the data. The QA/QC requirements should be commensurate with the importance of the work, available resources, unique needs of Ecology, and the consequences of potential decision errors.

Ecology's organization chart is included as Appendix C. The Quality Assurance Officer reports to the Manager of the Environmental Assessment Program, and does not have any direct responsibility for sampling or analysis (i.e., data acquisition).

Ecology programs with responsibilities for environmental data are described in Appendix D. The following sections list the QA/QC roles, authorities, and responsibilities of the personnel involved in data quality assurance.

QA/QC Responsibilities

Senior Management

Senior managers are responsible and accountable for accomplishing the mission and conducting overall operations of Ecology. The resources necessary to implement the Ecology QA policy are identified and budgeted by the Program Managers. The Director is responsible for designating the QA Officer, and Program Managers are responsible for designating QA Coordinators. In addition, senior management is responsible for:

- Preparing and revising this *Quality Management Plan*. The physical preparation may be assigned to staff, with senior managers participating in and supporting the effort.
- Understanding fully the content of this plan and concurring with its implementation.
- Allocating resources to implement the QA policy and this plan.

- Ensuring that Ecology QA policy and this plan are implemented.
- Delegating responsibilities for implementation of a quality system at appropriate levels of the organization.
- Building success measures into the quality system in order to know when it is working well.
- Assessing the adequacy of the quality system.
- Deciding whether to employ peer review in particular instances, in order to ensure that technical documents provide credible science and are reliable and readable.

Quality Assurance Officer

The QA Officer and staff are responsible for:

- Providing technical support to agency programs, working with the QA Coordinators to provide this support.
- Acting as the liaison between Ecology and other agencies on QA/QC matters.
- Informing management of QA/QC issues and problems.
- Assisting management, as requested, in the preparation of documents on QA/QC, including this agency *Quality Management Plan.*
- Reviewing and approving QA Project Plans prepared by Ecology staff. QA Project Plans submitted to the EPA must be approved by the QA Officer. Approval means that the QA Officer agrees that the project plan reflects adequate planning and contains sufficient information to allow competent staff to acquire and document the quality of data necessary to meet the objectives of the project.
- Providing technical assistance to Ecology staff in the implementation of QA Project Plans and the assessment of the quality of the results obtained.
- Preparing and maintaining *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies,* Ecology Publication No. 00-03-000.
- Assisting Ecology staff with the preparation of specialized documents involving the application of QA and QC principles.
- Coordinating training on QA and QC principles and practices to meet the needs of Ecology staff.
- Preparing a QA Report to Management every other year.

QA Coordinators

Program QA Coordinators are responsible for:

- Acting as point of contact within their programs for data quality issues.
- Coordinating with the agency QA Officer to identify needs related to QA Project Plan preparation, SOP preparation and maintenance, and QA/QC training.
- Assisting project managers with the review and approval of QA Project Plans prepared within the program.
- Assisting project managers to provide oversight for the preparation of QA Project Plans submitted to Ecology by responsible parties, contractors, and grant recipients.
- Providing technical assistance to program staff in the implementation of QA Project Plans and the assessment of the quality of the results obtained.
- Assisting with preparation and presentation of QA/QC training for program staff.
- Assisting program staff and grant recipients in meeting QA/QC requirements.
- Providing information to the QA Officer for the QA Report to Management.
- Additional responsibilities may be defined in program specific QA plans. For example, the Air Monitoring Quality Assurance Plan specifies some responsibilities of the QA Coordinator for the Air Quality Program.

Project Managers

Ecology project managers and project leads have overall responsibility for the conduct of specific environmental studies or for oversight of activities conducted through grants or contracts. They are responsible for:

- Preparing QA Project Plans.
- Assisting contractors, grant recipients and the regulated community with the preparation of QA Project Plans.
- Reviewing and approving QA Project Plans prepared for grant recipients and contractors.
- Overseeing the implementation of the QA Project Plan.
- Assessing and reporting the quality of data, based on data quality objectives.

Field Staff

Ecology staff who collect samples or data in the field have a vital role in the success of the projects. They are responsible for:

- Understanding and following the QA Project Plan.
- Checking all equipment and supplies in advance of field operations.
- Ensuring that samples are properly collected, preserved, labeled, packaged, and shipped.
- Ensuring that all field data are carefully recorded and preserved according to the project plan.
- Following chain-of-custody procedures and Standard Operating Procedures (SOPs) when they are required.

Manchester Environmental Laboratory Director

Ecology's Manchester Laboratory Director is responsible for:

- Direction and oversight of QA/QC for the laboratory.
- Designating the laboratory QA Coordinator.
- Approving QA Project Plans that involve laboratory services.
- Participating in and approving the preparation and revision of the *Lab Quality Assurance Manual* and the *Lab Users Manual*.
- Ensuring that the laboratory participates in all required external system audits and performance evaluation audits.
- Ensuring that the laboratory maintains accreditation for all parameters and methods used to produce environmental data.

Manchester Environmental Laboratory QA Coordinator

The QA Coordinator for Manchester Laboratory is responsible for:

- Reviewing QA Project Plans to ensure that the procedures specified for sampling and analysis are appropriate and that the number, type, and schedule of analyses required can be accommodated.

- Coordinating the preparation and revision of the *Lab Quality Assurance Manual* and the *Lab Users Manual*.

- Directing the preparation and maintenance of the administrative and technical Standard Operating Procedures (SOPs).

- Reviewing data produced by the laboratory for compliance with QA/QC requirements.

- Performing internal system and performance audits, to identify and correct problems affecting data quality.

- Coordinating the laboratory's participation in all external system and performance audits, including those required for accreditation.

Manchester Environmental Laboratory Staff

Laboratory staff provide analytical services, support services, and technical consultation, each of which includes QA responsibilities. Laboratory staff responsibilities include:

- Carefully following the administrative and technical SOPs.

- Analyzing samples according to methods specified in the QA Project Plan and documenting any necessary changes in the methods.

- Analyzing quality control samples according to guidance provided in their *Lab Quality Assurance Manual* and the QA Project Plans.

- Assuring that samples are analyzed within specified holding times, and providing complete and accurate data reports in a timely manner.

- Contributing to the preparation of the *Lab Quality Assurance Manual*, the *Lab Users Manual,* and SOPs in their area of expertise.

- Reviewing and verifying the results of analyses, including results from other laboratories when arrangements have been made for this service.

- Operation and maintenance of a Laboratory Information Management System (LIMS).

Laboratory Accreditation Unit

Laboratory Accreditation Unit staff are responsible for administering the Environmental Laboratory Accreditation Program according to the requirements specified in the Washington Administrative Code. Accreditation is granted to laboratories after auditing

them to determine that they have a demonstrated capability to accurately analyze environmental samples. Details of the responsibilities for accrediting laboratories are given in the *Procedural Manual for the Environmental Laboratory Accreditation Program* (Ecology Publication No. 91-34, January 1994).

Dispute Resolution

Oversight responsibilities for QA/QC may result in disagreements between the oversight group and the program reviewed. Such disputes may occur in situations involving technical issues (e.g., audits, surveillance, data quality assessments) and management issues (e.g., QMP reviews, management systems reviews).

Disputes should be resolved at the lowest management level possible.

All parties should make every effort to resolve disputes through discussion and negotiation.

If the parties are unable to resolve the dispute, this dispute resolution process should be followed.

- The process begins when either disagreeing party declares an issue to be unresolvable and sends a memorandum to the other party invoking this dispute resolution process, defining the disputed issue, and presenting supporting arguments for the first party's position on the issue.

- Within 15 days, the second party must send a draft dispute resolution package to the first party. As soon as possible after this the two parties, working together, must submit a dispute resolution package to management. This package would contain both party's arguments, both party's rebuttals, and any supporting materials.

- Management shall schedule a meeting for resolving the dispute within 15 days from receipt of the dispute resolution package, and notify both parties of this date. Both parties are invited to attend the resolution meeting to present arguments and answer questions. Management may get advice from a third party. The decision of management shall be binding on both parties.

Personnel Qualifications and Training

The QA Officer and staff, supported by the QA Coordinators and other designated staff, are responsible for QA/QC training of Ecology personnel. Those responsible for training shall maintain competence in QA/QC principles and practices through (1) the literature, (2) training offered by outside sources, and (3) participating in relevant regional and national conferences.

Ecology personnel shall have sufficient education and training in QA/QC practices to carry out their assigned responsibilities. Training is designed to raise the awareness of and competence in good QA/QC practices, and is provided on subjects such as sampling, statistics, the data quality objectives process, preparation of QA Project Plans, environmental measurements, and analytical quality control.

The QA Officer and staff identify and make use of resources from inside and outside of Ecology in providing training. Many Ecology staff have extensive experience in their areas of specialization that can be incorporated into the training.

Ecology programs may have unique requirements for QA and QC training, and program QA Coordinators help identify their training needs. They arrange for the necessary training using resources available within their programs or by securing the assistance of the QA Officer or external resources.

At the agency level, training resources are primarily directed toward "Core" requirements. Technical training is addressed program by program, on an as-needed basis.

Procurement of Items and Services

The Purchasing Office, located in the Purchasing and Stores Section of Financial Services, is responsible for the procurement of all supplies, equipment, and services used by the agency statewide. Chapter 8 of the *Ecology Policy and Procedure Manual* includes the policies and procedures on purchasing/inventory/payables.

Ecology's Manchester Laboratory contracts with other laboratories to perform analyses that Manchester Laboratory is unable to perform. Such laboratories must be accredited by Ecology, in accordance with Ecology Policy 1-22. Analyses of samples are contracted in accordance with WAC 236.48 and RCW 43.19.1906 and as described in the memo "Office of State Procurement Specific Authority Delegated to Department of Ecology, July 1, 1990." Laboratory Standard Operating Procedures related to contracting include SOP 770003 "Purchasing Analytical Services", and SOP 770005, "Data Quality Validation." Data from analyses performed by contracted laboratories are reviewed by Manchester Laboratory to determine if the quality of data meets agency needs and complies with the contract requirements.

Documentation and Records

Chapter 10 of the *Ecology Policy and Procedure Manual* includes the policies and procedures on records/forms/public disclosure.

Two principal forms of quality system documentation are required by the ANSI/ASQC E4 standard: an agency *Quality Management Plan* and QA Project Plans.

Manchester Laboratory prepares a *Lab Quality Assurance Manual* and a *Lab Users Manual.*

Standard Operating Procedures are prepared for laboratory and field activities.

EPA QA requirements and QA guidance documents are used when available for preparation of quality system documents. These EPA documents can be found at EPA's QA staff Internet site, whose address is included in Appendix A. Internet addresses for other sources of QA information are also included in Appendix A.

Documents and records, including revisions, must be reviewed for conformance with the quality system requirements and approved by authorized personnel for general use.

Computer Hardware and Software

The quality of hardware and software used in the agency is covered in other policy and management documents. Information management includes policies and procedures for information technology acquisitions, information technology planning, geographic information systems, and the Information Integration Project. Agency Application, Data & Database, Information Technology Project Management, and "Section only" Standards have been prepared and are available on the agency Intranet. The Washington State Department of Information Services (DIS) also has policies and procedures to ensure the quality of hardware and software used by state government.

Planning

Data quality assurance begins with careful planning. The goal and specific objectives for the environmental project are clearly defined, including how the data will be used. Then data quality objectives, as well as qualitative and quantitative statements about the data needed to support specific decisions or regulatory actions, are developed. Finally, the methods to collect samples, make measurements, document data quality, and interpret and report results are selected or developed.

- The data quality objectives (DQOs) process is the recommended planning approach. It is based on the scientific method and makes use of statistical tools. The project manager leads a team of experts in developing DQOs, which provide the basis for preparing the QA Project Plan. The DQO process is described in *Guidance for the Data Quality Objectives Process* (EPA QA/G-4) and *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (*Ecology Publication No. 00-03-000).

- Preparing a QA Project Plan helps ensure that the project manager follows a systematic planning process. The completed plan (1) facilitates communication among managers, field personnel, and laboratory personnel who implement the project, (2) promotes consistency in data collection activities, and (3) provides the basis for project reports.

- *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (*Ecology Publication No. 00-03-000) provides the project manager with guidance for preparing QA Project Plans suited to Ecology projects. The guidelines, which follow and expand upon EPA Requirements and Guidance (EPA Documents QA/R-5 & QA/G-5), describe the elements to be considered for inclusion in a QA Project Plan.

- Project plans are developed in advance for emergency response situations. Templates are prepared for projects that are repetitive in nature, such as compliance inspections.

- Program-specific guidance documents are prepared, when needed, to address the unique QA requirements of Ecology programs.

Implementation of Work Processes

The project manager is responsible for oversight in the implementation of QA Project Plans. Management is kept informed of progress and problems in implementation.

Standard Operating Procedures are prepared using the guidance provided in EPA QA/G-6, *Guidance for the Preparation of Standard Operating Procedures for Quality-Related Operations*.

All relevant facilities, equipment, and services must be capable of producing environmental data of sufficient quality to meet project goals in a safe and efficient manner.

Manchester Laboratory is responsible for including appropriate QA and QC procedures along with the analyses of samples. These procedures are described in the *Lab Quality Assurance Manual*.

Manchester Laboratory also provides *a Lab Users Manual* to help coordinate field and lab operations.

The Laboratory Accreditation Unit administers the Environmental Laboratory Accreditation Program.

Assessment and Response

The effectiveness of the quality system is continually assessed. Available assessment tools include data quality assessments, peer reviews and technical reviews, performance audits, and technical systems audits.

The project manager is responsible for assuring that data quality assessment is done for each project that involves environmental data. Data quality assessment is a statistical and scientific evaluation of data to determine if data are of the right type, quality, and quantity to support their intended use.

Manchester Laboratory is responsible for reviewing the results of sample analyses to ensure that the quality control requirements, as stated in the *Lab Quality Assurance Manual* and the QA Project Plan, have been met. Corrective actions are taken when these requirements are not met.

As part of its accreditation requirement, Manchester Laboratory participates in performance audits and system audits. Performance audits involve the analyses of unknown performance evaluation samples. External system audits correspond to audits of the laboratory's managerial and technical capability by an outside auditor. Internal system audits are also performed periodically.

Prior to initiation of internal audits, management is responsible for choosing the assessors, defining acceptance criteria, approving audit procedures and check lists, identifying goals, and determining the assessment procedures to be used. Senior management shall assess (at least annually) the adequacy of the quality system.

The Laboratory Accreditation Unit is responsible for performing system and performance audits of participating laboratories.

Reports of assessments are prepared and submitted to management. When the findings of the assessments identify conditions needing corrective action, management responds promptly and appropriately. Corrective actions are documented by the responsible persons, to confirm the implementation and effectiveness of the response action. Senior management is responsible for addressing any disputes concerning the assessments.

The QA Officer keeps the Program Manager for the Environmental Assessment Program informed of QA accomplishments and any problems that arise. The QA Officer discusses any relevant QA issues or problems with the appropriate Program Manager and/or program QA Coordinator.

The QA Officer prepares a status report for management every two years. This report contains, as a minimum, the following information:

- A description of QA/QC training received by Ecology staff

- A description of technical assistance and QA/QC support provided to Ecology staff
- Significant problems and recommended corrective actions
- The accreditation status of the Manchester Environmental Laboratory
- A review of the Ecology *Quality Management Plan* to determine if the approved quality management practices continue to be both suitable and effective
- Other information specifically requested by management

Quality Improvement

The agency has a Quality Improvement Plan, which is posted on the agency's Internet site. This plan describes the structure and leadership, and provides agendas and guidance, including specific tasks, target dates, and status, for the following:

- Strategic planning and performance improvement
- Human resource and management development
- Customer satisfaction
- Process improvement
- Self-assessment and benchmarking

An internal quality consultant heads a Quality Steering Committee composed of Ecology management and staff, dedicated to providing direction to the agency in performance and service requirements.

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Appendices

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Appendix A

Internet and Intranet Addresses for QA Sources

Internet

EPA Quality Assurance Staff

http://www.epa.gov/quality/

EPA Quality Systems Documents

http://www.epa.gov/quality/qa-docs.html

Laboratories Accredited by Ecology

http://www.wa.gov/ecology/eils/labs/labs_main.html

Ecology Quality Improvement Plan

http://www.wa.gov/ecology/quality/qiplan.html

Intranet

Quality Assurance Links

http://aww.ecoweb.ecy.wa.gov/eap/index.html

Standards and Guidelines: Ecology Application, Database, and IT Project

http://aww.ads.ecy.wa.gov/ads/standards/index.asp

Executive Policy

Chapter 1: Executive Policy and Procedure ***Policy 1-21***

Resource Contact: Quality Assurance Officer *Effective*: August 25, 1993

References: Ecology Quality Management Plan *Revised*: October 6, 1999

Establishing Quality Assurance

Purpose: To ensure the consistent application of quality assurance principles to the planning and execution of all activities that acquire and use environmental measurement data.

Application: This policy applies to environmental data collection studies/activities conducted or funded by Ecology.

1. Establishing Definitions.

Quality Assurance (QA): The integrated program for assuring the reliability and quality of environmental data.

2. Quality Management Plan Provides Guidance.

This policy is the basis for QA management in Ecology and is the foundation for developing the Quality Management Plan. The plan describes the principles and practices that lead to effective planning and execution of environmental studies/activities that generate valid and useful data.

3. Assigning Quality Assurance Responsibilities.

The Director designates the agency's Quality Assurance Officer.

Program managers with responsibilities for environmental data designate a Quality Assurance Coordinator to provide QA support/oversight within their program.

4. QA Project Plans for Environmental Studies/Activities are Prepared, Reviewed, and Approved.

A Quality Assurance Project Plan is prepared for each environmental study/activity that acquires or uses environmental measurement data. The Quality Assurance Project Plan lists the objectives of the study/activity; identifies the data needed to achieve those objectives; and describes the sampling, measurement, quality control, and data assessment procedures needed to obtain the data. The size and complexity of the project plan will be cost effective and in proportion to the magnitude of the study per Ecology Document No. 91-16, "Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies."

Quality Assurance Project Plans are developed, reviewed, and approved as specified in the Quality Management Plan, before data collection begins.

5. Quality Assurance Staff Provide Technical Assistance and Training.

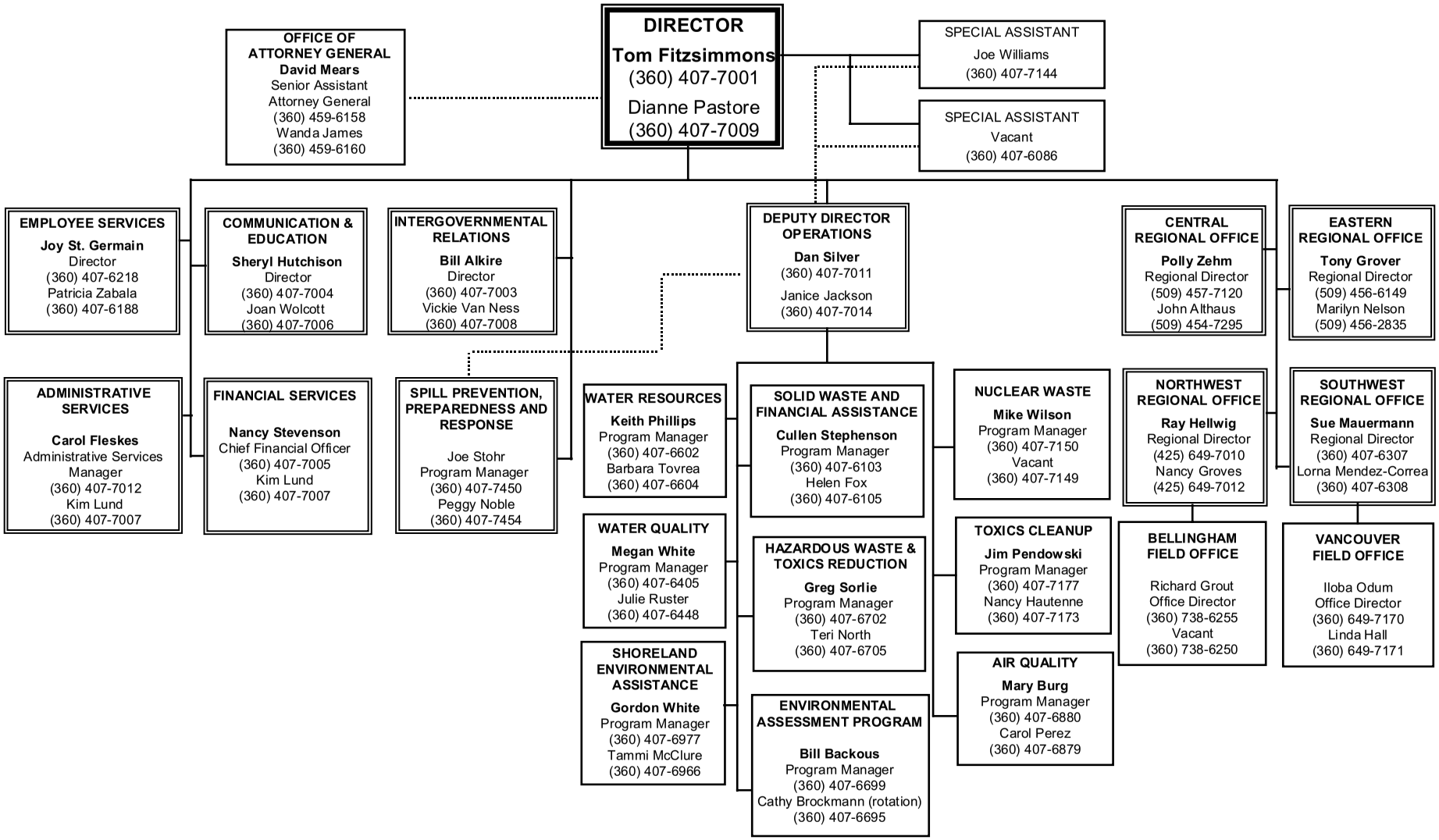
The Quality Assurance Officer and staff provide technical assistance with quality assurance matters and coordinate quality assurance training for Ecology personnel.

Approved: 

Tom Fitzsimmons
Director

Appendix C. Ecology Organization Chart

Washington State Department of Ecology



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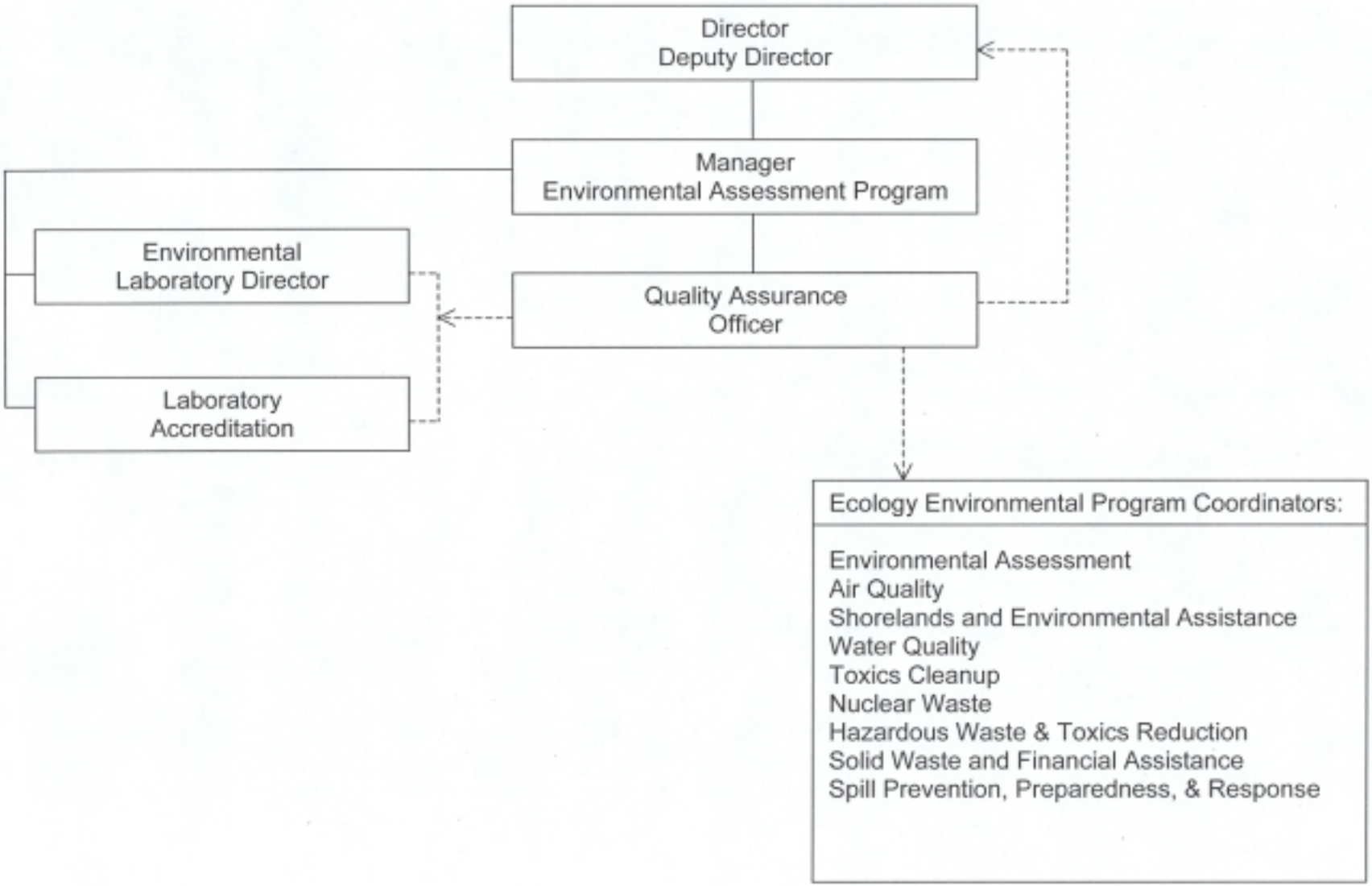
DEPARTMENT OF ECOLOGY: QUALITY MANAGEMENT PLAN

QA MANAGEMENT STRUCTURE



Appendix D

Ecology Programs with Responsibilities for Environmental Data

Air Quality Program is responsible for air pollution control activities including operation of the statewide air quality surveillance system. Other functions include development of emission inventories, modeling, meteorology, and smoke management. The *Air Monitoring Quality Assurance Plan* describes how Ecology ensures the quality of ambient atmospheric data. An *Emission Inventory Quality Assurance Plan* is being prepared to ensure the quality of point source emissions inventory data. The Quality Assurance Unit provides QA oversight and data validation and reporting.

Environmental Assessment Program provides specialized expertise in project design and management, environmental sampling, analytical services, data management, and quality assurance in support of other Ecology programs. Program staff conduct long-term baseline studies and cause-and-effect studies on surface waters, investigations of toxic pollution and groundwater contamination, and compliance inspections of permitted municipal and industrial facilities. Ecology's environmental laboratory at Manchester performs physical, chemical, and biological measurements on all types of environmental samples. The Laboratory Accreditation Unit at Manchester accredits laboratories that conduct tests for, or prepare analytical data for, submittal to Ecology.

Hazardous Waste and Toxics Reduction Program administers the state program governing the generation, transportation, storage, and disposal of dangerous waste. Activities include sampling at hazardous waste sites. Toxics reduction activities include administration of contracts for research in waste reduction and recycling, as well as assisting businesses in developing new methods of reducing the volume and changing the character of their wastes.

Nuclear Waste Program, under authority of the Hanford Federal Facility Agreement and Consent Order, and in cooperation with EPA and the U.S. Department of Energy, is responsible for the identification, management, and remediation of hazardous substances, including radionuclides and dangerous wastes, at the Hanford Site. The program administers state-mandated environmental regulations and works in association with EPA to implement federal regulations at non-Hanford RCRA permitted facilities. Activities include split sampling, laboratory audits, mixed waste laboratory contracting, data verification and validation, and participation in the Washington State Department of Health environmental radiation quality assurance task force laboratory intercomparison performance evaluation program.

Shorelands and Environmental Assistance Program provides support to local agencies developing watershed plans to control non-point pollution sources affecting shellfish growing areas, and funds enforcement activities related to agricultural sources. The

program administers the Padilla Bay National Estuarine Research Reserve and the state wetlands management program.

Solid Waste and Financial Assistance Program provides oversight and technical support to local authorities who monitor and regulate solid waste management facilities; develops statewide solid waste management regulations; regulates major industries to ensure consistent and effective enforcement of air, water, and waste laws; coordinates litter control programs and operates a youth litter collection program; regulates biosolids management; promotes waste reduction, recycling, and waste utilization; provides financial assistance to local governments for cleanup of hazardous waste sites, implementation of solid waste and hazardous waste management programs, meth lab cleanup responsibilities, and litter cleanup projects; provides grants to citizen organizations whose communities are adversely impacted by hazardous waste sites.

Spill Prevention, Preparedness and Response Program (Spills Program) works with facilities and vessels to ensure that personnel are trained, equipment is available, and plans are in place to prevent spills and to respond appropriately to spills when they do occur. Program staff respond to all spills to ensure that they are cleaned up properly and to protect state resources.

Toxics Cleanup Program oversees the control and cleanup of sites that pose a threat to public health or the environment. Cleanup activities are performed by the responsible parties or by a contractor under a federal or state mandate. The program also includes the Urban Bay Action Teams that focus on potential sources of pollution of sensitive bays and inlets.

Water Quality Program issues discharge permits and conducts inspections of permitted facilities. Staff also sample surface water and groundwater, and provide training for industries on wastewater management. Program staff also administer state and federal grants to local governments for water quality projects involving watershed and stormwater management, agricultural pollution abatement, and wastewater treatment and control facilities. Those projects may include environmental monitoring activities in fresh or marine surface water and in groundwater.

Water Resources Program administers groundwater management grants to local governments, monitors groundwater for seawater intrusion, and tracks groundwater levels as indicators of water supply and dam stability.